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IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re patent application of Sofiène Affes <i>et al</i>	CASE NO. AP660761US
Serial No: 09/742,421	Group Art Unit: 2631
Filed: December 22, 2000	Examiner: Tesfaldet Bocure
For: Interference Suppression in CDMA Systems	

Commissioner of Patents and Trademarks  
United States Patent & Trademark Office  
P.O. Box 1450  
Alexandria, VA 22313-1450  
U.S.A.

RESPONSE

Sir:

This is a response to the Office Action mailed June 1, 2004.

Claims 1 through 71 are of record in the application. In the Office Action, claims 1-48 and 50-71 were allowed. Claim 49 was rejected under 35 U.S.C. 103(a) as unpatentable over the known spatio-temporal receiver disclosed in Applicants' Figure 5 and the article by Bensley *et al.* This rejection of claim 49 under 35 U.S.C. 103(a) is respectfully traversed.

It should be noted that, in Applicants' specification, the convention is to show symbols representing **matrices** in bold and to show symbols representing vectors in regular text but underlined.

With respect, the fact that Bensley *et al.* disclose the use of an observation vector is immaterial. The invention defined in claim 49 is not predicated upon the use of an observation vector *per se*, but rather upon the use of both an observation vector ( $\underline{Y}_n$ ) and a post-correlation observation vector ( $\underline{Z}_n^d$ ), i.e., one vector that has not been despread and one vector that has

been despread. (See claim 49, line 3 and lines 10-11). The former is used by the beamformer, which operates at the symbol rate, and the latter is used to update channel coefficients, which can be done more slowly.

In the prior art receiver shown in Figure 5, the despreaders 19<sup>1</sup> - 19<sup>U</sup> each include a

despreading filter 25<sup>u</sup>, which despreads the  $M \times (2L-1)$  matrix  $\mathbf{Y}_n$ , and a vector reshaper 26<sup>u</sup> which reshapes the resulting matrix, thus forming the  $ML \times 1$  **post-correlation** vectors

$\underline{Z}_n^1 \dots \underline{Z}_n^U$ , respectively. Within each of the STAR sections 20<sup>u</sup>, the same post-correlation (i.e.,

despread) observation vector  $\underline{Z}_n^u$  is applied to both the beamformer 27<sup>u</sup> and the channel

identification unit 28<sup>u</sup> (the latter tunes the former with  $\hat{H}_n^d$  as detailed in Figure 12).

In the receiver shown in Figure 27, to which claim 49 is related, the vector reshaper 44 does not despread the matrix  $\mathbf{Y}_n$  but merely reshapes it to form the  $M(2L-1)$  observation vector  $\underline{Y}_n$ . The observation vector  $\underline{Y}_n$  is applied to the beamformer 27N<sup>d</sup>. The despreader 19<sup>d</sup> both despreads and reshapes the matrix  $\mathbf{Y}_n$  to form the post-correlation observation vector  $\underline{Z}_n^d$  which

it applies to the channel identification unit 28N<sup>d</sup>. Thus, the beamformer 27N<sup>d</sup> uses an observation vector that has not been despread and the channel identification unit 28N<sup>d</sup> uses an observation vector which has been despread. (The channel identification unit tunes the beamformer with  $\hat{Y}_n^{0,d}$  as detailed in Figure 10). An advantage of this arrangement is that it

allows the channel characteristics to be updated less frequently than every symbol period, which can be tolerated because channel characteristics generally change relatively slowly, at least as compared with the symbol rate. Hence, this arrangement, in which the despreading and reshaping need not be carried out at the symbol rate, advantageously reduces computational requirements.

Neither Figure 5 of Applicants' specification nor Bensley *et al*'s article discloses a spatio-temporal array receiver in which the beamformer uses an observation vector that has not been despread and the channel identification unit uses the observation vector after it has been despread. Moreover, these references, whether taken individually or in combination, would not motivate a skilled addressee to modify the receiver of Figure 5 so that the beamformer and the channel coefficient unit used observation vector without and without despreading.

Accordingly, it is submitted that claim 49 is patentable over the applied references.

The three references cited in paragraph 5 of the official letter as "pertinent" have been considered and are not considered so pertinent as to affect patentability of the present invention.

Regarding paragraph 1 of the official letter, the required certified copy has been supplied,

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and was received by the Office on June 21, 2004.

Regarding the objection that the documents cited in the two Information Disclosure Statements were not submitted with them, as explained to the examiner in a telephone call on July 27, 2004, , our records show that they were. Since Given the large number of documents involved, and the cost of reproducing them, it is requested that a search be made within the Office to locate them. If such a search is fruitless, the examiner is invited to telephone the undersigned and replacements will be made and submitted.

In view of the foregoing, it is submitted that the application is in condition for allowance and early and favourable reconsideration is respectfully requested.

Respectfully submitted,



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